

Do-more with Terminator I/O Modules!



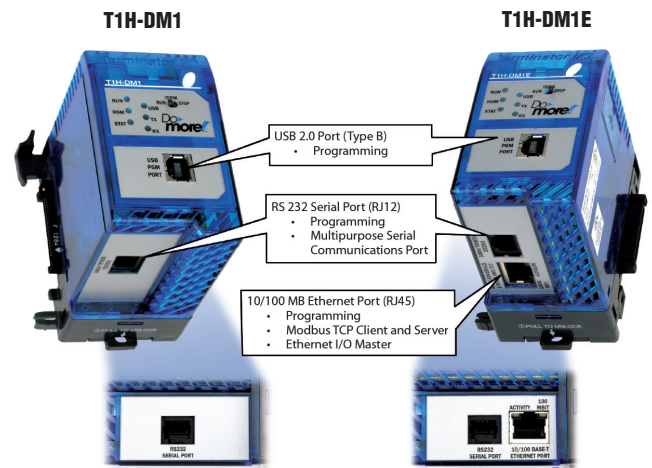
The Do-more T1H series CPUs are the new “brains” for the time-tested Terminator Field I/O hardware. The chip set inside includes the exact same processor as is used in the Do-more H2 series. The feature set for these CPUs is identical. Your ladder code is even portable between the two hardware platforms.

There are two T1H CPU options:

- T1H-DM1 \$359.00 (1) USB port, (1) full-duplex serial port
- T1H-DM1E \$459.00 (1) USB port, (1) full-duplex serial port, (1) Ethernet port

- Over 1M bytes total memory (includes program, data and documentation)
- Program/monitor/debug over any embedded communication port.
- Power supply modules are available for AC or DC power input. Add additional power supplies in-line with Terminator I/O modules as needed to power the modules AND to supply isolated 24 VDC power for field devices.
- 28 Terminator I/O modules are available, from discrete and analog to high-speed counting

Note: Do-more CPUs are programmed with the Do-more Designer software. DirectSOFT is not compatible with these CPUs. However, a conversion utility is available for ladder programs developed with DirectSOFT.



Compatible products include:

- C-more and C-more Micro HMI products
- Stride® Ethernet switches
- Connectivity to SureServo® and SureStep® motion products
- Variable frequency drives and AC motors
- Discrete and process sensors

Both T1H CPU modules ship with a coupon for free online training.

30 Days of Free Training!

Your purchase of this Do-more PLC product qualifies you for 30 days of free online training.

Visit www.do-moreplctraining.com and enter the code above to take advantage of this offer!

INTERCONNECTING AUTOMATION

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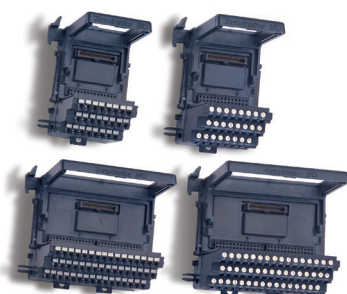
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Two sizes of terminal bases accommodate all I/O modules

- Half-size bases for modules with up to 8 points for only \$55.00 (T1K-08B, T1K-08B-1)
- Full size bases for modules with up to 16 points for only \$69.00 (T1K-16B, T1K-16B-1)
- Triple-stack terminal blocks standard, easy to connect multi-wire devices
- Same bases for all I/O modules - AC, DC, and analog
- Screw and spring clamp terminals



Power supplies - freedom of choice, freedom to expand

- DC power supplies for \$111.00 (T1K-01DC), AC versions only \$116.00 (T1K-01AC)
- AC supplies include 24 VDC auxiliary supply for convenient field device wiring
- Need more power for high current devices or modules? Just add another power supply before the next modules in the system!

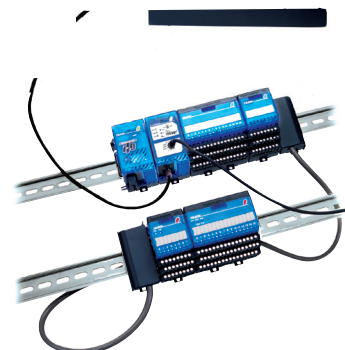


8-channel I/O 16-channel I/O

Four types of 8-channel I/O
Four types of 16-channel I/O
Two types of combination I/O
Thermocouple and RTD modules

Analog modules at a super low price per channel

- 8-channel input modules starting at \$290.00
- 16-channel output modules starting at \$591.00
- 0-20mA/4-20 mA and unipolar/bipolar voltage models available
- 14-channel thermocouple module only \$519.00 (T1F-14THM)



Local expansion - up to two additional rows

- Full backplane expansion through cables
- Connect up to 16 modules across three total rows by plugging expansion cables from the side of one module to the side of the next. The system automatically recognizes the I/O.
- Optional cable that includes 24 VDC pins maximizes your power supply capability.

Discrete I/O with the features you need

- 8-point I/O modules starting at only \$69.00
- 16-point I/O starting at only \$119.00
- All DC input modules are sink/source jumper configurable
- Diagnostic LEDs for blown fuse and 24 VDC power on applicable modules



8-point I/O



16-point I/O



Specialty module

- **Counter** module with pulse out, \$311.00 (T1H-CTRIO)

DL205 I/O

- Connect DL205 Ethernet-based remote I/O drops to the optional Ethernet port on the -T1H-DM1E CPU
- Dozens of I/O option modules supported, including high-density discrete modules



Do-more with High-speed I/O!

High-speed operations

The T1H-CTRIO module is capable of a wide variety of high-speed input and output operations. Many of these operations take place on board the module, and are independent of the scan time of your PLC. With flexible 4-channel input and separate output channel design, these modules can satisfy high-speed counting, timing, and pulse catch operations, along with high-speed discrete output or several profile choices of pulse output operations. Not all combinations of input functions and output functions are possible within the resources of the module, but these examples are typical of the applications for these modules.

\$334

High Speed Counter Module

Counting & timing up to 100 kHz:

T1H-CTRIO \$311.00

Four 100 kHz inputs, and two 20-25 kHz pulse train outputs



Inputs Supported:

- Counter
- Quad Counter
- Pulse Catch
- Edge Timer
- Dual Edge Timer

Outputs Supported:

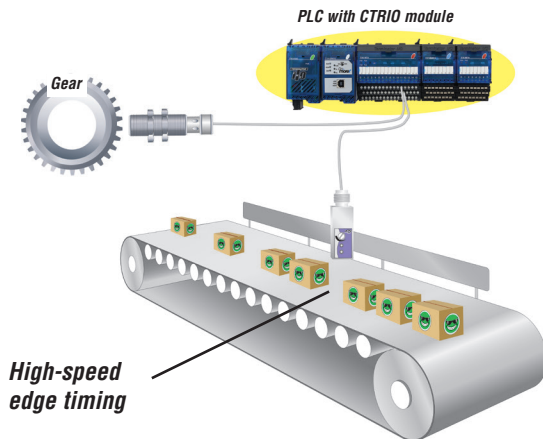
- Pulse train - used for servo/stepper motor control. Configurable for CW/CCW or step and direction.
- Discrete outputs - assigned to Counter/Timer input functions
- Raw output - outputs controlled directly from the CPU interface program

Improved to Do-more!

All your CTRIO configuration is done through the Do-more Designer Software - no more separate software "workbench". And if you should need to replace a high-speed module, all the setup parameters and profiles are stored in the CPU and are automatically loaded and ready to go when the system powers up.

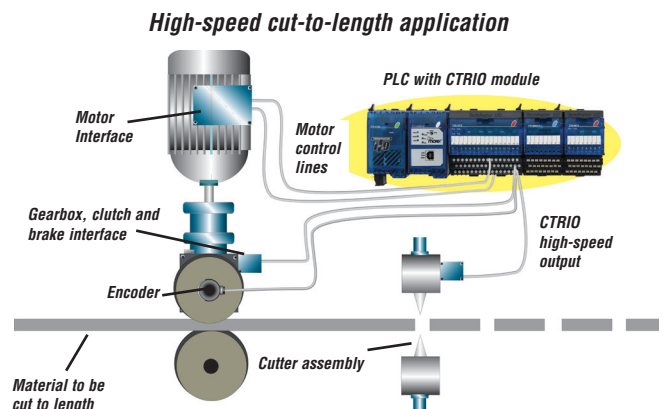
High-speed timing

The T1H-CTRIO module can be configured for timing functions based on both count or rate. Using a common configuration of a proximity switch sensing the teeth on a gear, the module is able to calculate the velocity of the gear based on the rate at which it receives counts. This value can be scaled within the module to the engineering units required for the application.



High-speed counting

The T1H-CTRIO module can be configured for counting functions via the use of an encoder input. Up to two quadrature encoders per CTRIO module are available with connections for external reset, capture and inhibit signals. In a simple cut-to-length application as shown below, the encoder provides an input position reference for the material to the module. The module's high-speed outputs are wired to the cutting device and to the clutch and/or braking device. When the count from the encoder is equal to a pre-programmed setpoint within the module, the high-speed outputs are activated to stop and cut the material to a repeatable fixed length. Additionally, the clutch/brake signal can be used as an inhibit signal so counts are not accumulated while the material is being cut.



Do-more T1H Series PLC Overview

Do-more T1H Series PLC

The T1H Series PLC takes the modular and space-saving package of our Terminator I/O line and converts it into a stand-alone control system. Using Do-more Designer as a foundation, the T1H Series PLC system provides a powerful, flexible instruction set, inside a user friendly programming environment.



Do-more T1H PLC System with T1H-DM1E CPU Module

CPU modules

The Do-more T1H Series PLC offers two CPU modules, T1H-DM1 and T1H-DM1E, both of which must be programmed using the Do-more Designer programming software version 1.2 or later.



Base units

The Do-more T1H Series PLC supports all of the base units available for the Terminator I/O line.

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Discrete I/O modules

The Do-more T1H Series PLC supports all of the discrete I/O modules available in the Terminator I/O product line.



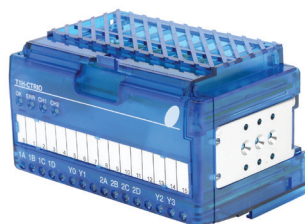
Analog I/O modules

The Do-more T1H Series PLC supports all of the analog I/O modules available in the Terminator I/O product line.



Specialty module

The Do-more T1H Series PLC supports the T1H-CTRIO High-Speed Counter I/O module that is available in the Terminator I/O product line.



T1H-CTRIO

Programming Software

The Do-more T1H Series PLC can only be programmed by Do-more Designer version 1.2 or later.



Do-more T1H Series PLC Overview

Module Compatibility

The following table shows which Terminator I/O product line components are supported by the T1H-DM1 and T1H-DM1E Do-more CPUs.

Module Compatibility Table					
Module	Part Number	Status	Module	Part Number	Status
Base Units	T1K-08B	✓	Analog I/O Modules	T1F-08AD-1	✓
	T1K-08B-1	✓		T1F-08AD-2	✓
	T1K-16B	✓		T1F-16AD-1	✓
	T1K-16B-1	✓		T1F-16AD-2	✓
Discrete I/O Modules	T1K-08ND3	✓		T1F-14THM	✓
	T1K-16ND3	✓		T1F-16RTD	✓
	T1K-08NA-1	✓		T1F-08DA-1	✓
	T1K-16NA-1	✓		T1F-08DA-2	✓
	T1K-08TD1	✓		T1F-16DA-1	✓
	T1K-16TD1	✓		T1F-16DA-2	✓
	T1K-08TD2-1	✓		T1F-8AD4DA-1	✓
	T1K-16TD2-1	✓		T1F-8AD4DA-2	✓
	T1H-08TDS	✓	Specialty Module	T1H-CTRIO	✓
	T1K-08TA	✓			
	T1K-16TA	✓			
	T1K-08TAS	✓			
	T1K-08TR	✓			
	T1K-16TR	✓			
	T1K-08TRS	✓			

✓ = Supported

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Communications

The Do-more T1H Series PLC supports many communication protocols. The following table shows which CPU module communications port supports each protocol.

<i>Protocols</i>	CPU Modules		
	T1H-DM1 / T1H-DM1E	T1H-DM1E	T1H-DM1E
	USB Port	RS-232 Serial Port	Ethernet Port
<i>Do-more Designer Programming</i>	Yes	Yes	Yes
<i>Modbus/RTU Client (Master)</i>		Yes	
<i>Modbus/RTU Server (Slave)</i>		Yes	
<i>Modbus/TCP Client (Master)</i>			Yes
<i>Modbus/TCP Server (Slave)</i>			Yes
<i>DirectLOGIC RX/WX Client (Master)</i>			Yes
<i>DirectLOGIC RX/WX Server (Slave)</i>			Yes
<i>K-Sequence Server (Slave)</i>		Yes	
<i>DirectNET Server (Slave)</i>			
<i>HEI Ethernet I/O Master</i>			Yes
<i>SMTP (EMail) Client w/Authentication</i>			Yes
<i>Simple Network Time Protocol (SNTP) Client</i>			Yes
<i>Do-more/PEERLINK</i>			Yes
<i>Do-more Time Synchronization Protocol (Client, Server, Alternate Client)</i>			Yes
<i>Do-more Logger/UDP</i>			Yes
<i>Serial ad-hoc ASCII/Binary Programatic Control</i>		Yes	
<i>UDP ad-hoc Programmatic Control</i>			Yes
<i>TCP Client Programmatic Control</i>			Yes
<i>TCP Server Programmatic Control</i>			Yes

Blank = Not Supported

Do-more T1H Series PLC Overview

Do-more T1H Series PLC Hardware User Manual (T1H-DM-M)

Do-more T1H Series PLC Hardware User Manual is available as a free download from Automationdirect.com. A hard copy is also available for purchase.

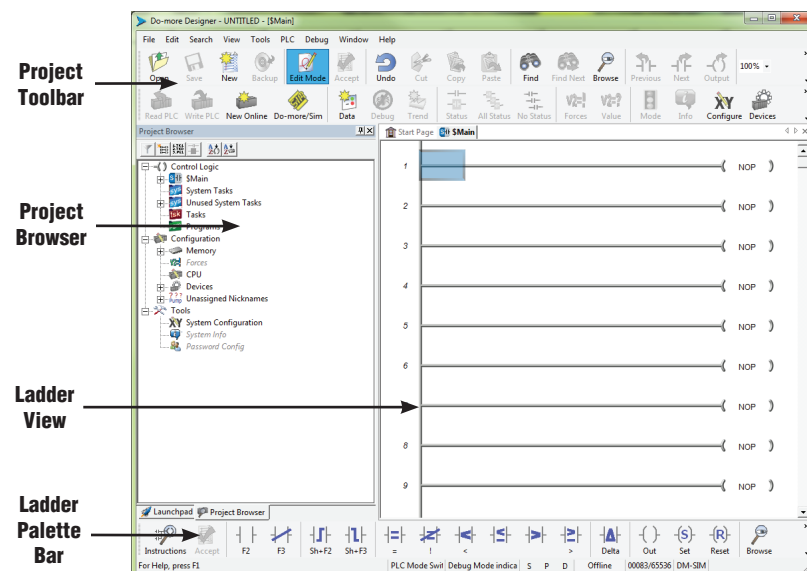
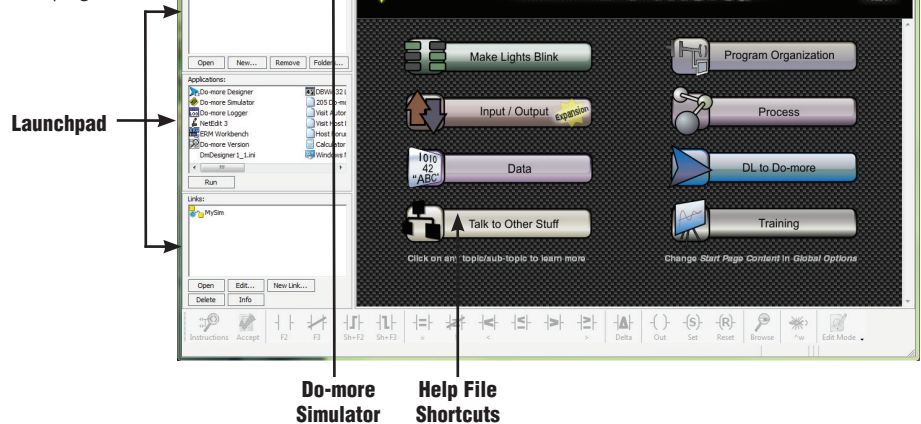
Do-more Designer (Part No. DM-PGMSW)

Do-more Designer is the full-featured programming software for the Do-more PLC series. Do-more Designer is a free download from Automationdirect.com. A CD-ROM version is also available for purchase for \$10.00.



Start Page

When the software is started, the Start Page is displayed. This page contains a Launchpad with Projects, Applications and Links windows. It also contains shortcuts to important help file topics, and you can start the Do-more Simulator from this page.



Main Programming Window

The Main Programming Window is displayed when a new project is started or an existing project is opened. It is divided into Menus, Toolbars, and Windows that work together to make project development simple.

Do-more T1H Series PLC Overview

Do-more Designer Features

Do-more Designer has the following main features:

- Supports the Do-more PLC instruction set
- Project Browser (Window to organize the user project)
- Data View (Interface to monitor and edit PLC data in a list)
- Trend View (Interface to monitor PLC data with trend graphs)
- PID View (Interface to monitor and tune the individual PID control loop)
- PID Overview (Interface to monitor multiple PID control loops)
- Debug View (Interface to debug the ladder programs)

When Do-more Designer is installed on your PC, the following tools are also installed:

- Do-more Simulator (Offline simulator of ladder program execution and PID control)
- Do-more Logger (Software tool to log PLC data)
- ERM Workbench (Configuration tool for the ERM modules)
- NetEdit 3 (Configuration tool for the ECOM/EBC Ethernet modules)

PC Requirements

The Do-more Designer Windows-based programming software works with Windows® XP (Home or Professional, 32-bit), Vista (Home, Basic, Premium, 32 or 64-bit), Windows 7 (Home, Professional, Ultimate, 32 or 64-bit) or Windows 8 (Home, Professional, Enterprise 32 or 64-bit; Windows 8 RT edition is NOT supported). Please check the following requirements when choosing your PC configuration:

- Minimum PC to PLC Connectivity, at least one of the following:
 - USB Port: connects to the CPU with USB-A connector (USB-A to USB-B cable)
 - RS-232 Serial Port: connects to the CPU with RJ-12 connector (RJ-12 to DB9 or RJ-12 to USB-B serial converter cable)
 - Ethernet Port: connects to the CPU (T1H-DM1E) with RJ-45 10Base-T or 100Base-T (Cat5 Patch Cable)
- Hard Disk: 100MB free disk space
- Video Display: 1024x768, 256 colors resolution (1280x720, true color recommended)
- Windows XP, 32-bit:
 - 800MHz, single core CPU (2GHz, multi-core or hyperthreaded recommended)
 - 512MB RAM (2GB recommended)
- Vista or Windows 7 or Windows 8, 32 or 64-bit:
 - 1GHz, single core CPU (2GHz, multi-core recommended)
 - 1GB RAM (3GB recommended)

Programming Cables

The Do-more T1H Series CPU module T1H-DM1 has two communication ports (USB and RS-232 Serial) and the T1H-DM1E has three communication ports (USB, RS-232 Serial and Ethernet). You can use any of those ports for programming and monitoring. Cables for these ports are listed below and can be purchased at Automationdirect.com.

USB Cables (USB 2.0, Type A-B connectors):

- USB-CBL-AB3 (3 ft.)
- USB-CBL-AB6 (6 ft.)
- USB-CBL-AB10 (10 ft.)
- USB-CBL-AB15 (15 ft.)

RS232 Serial Cable

- D2-DSCBL (12 ft. 9-pin D-sub to RJ12 connector)

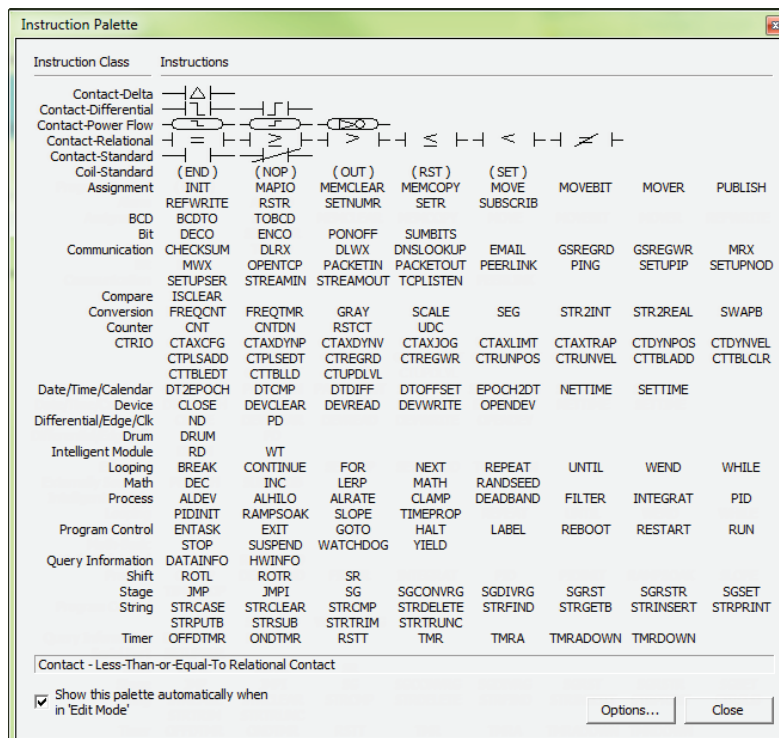
Ethernet Cables (Cat5e)

Automationdirect.com sells many Ethernet patch cables in various colors and lengths. Please check the Cables section in this catalog for further details.

Do-more T1H Series PLC Overview

Do-more PLC Instruction Set

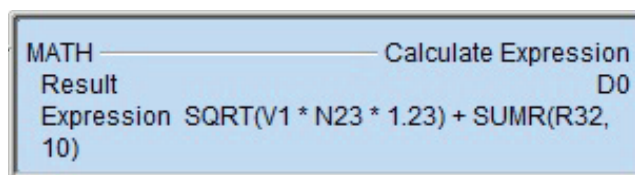
This Instruction Set was developed specifically for the new Do-more PLC series; the 'Instruction Palette' displays all available instructions.



You may see some similarities to the DirectLOGIC PLC instruction set. However, the instruction set for the Do-more PLC is more advanced and intuitive. A good example is the MATH instruction. Now, just one MATH instruction covers all math operations and also allows you to mix different data types in one expression.

There are over 60 operators and functions available with the MATH instruction.

Note: To learn more about the MATH instruction, please refer to the Do-more Designer help topic 'MATH – Calculate Expression'.



Operators

+, -, *, /, %, **, <, <=, ==, !=, >, >=, &&, ||, &, |, ^, <<, >>, >>>, ~, !

Functions

ABS, ACOS, ASIN, ATAN, AVGR, COS, COUNTIFEQ, COUNTIFNE, COUNTIFGE, COUNTIFGT, COUNTIFLE, COUNTIFLT, DEG, E, FRAC, IF, LN, LOG, MAXR, MAX, MINR, MIN, NOW, PI, RAD, RANDINT, RANDREAL, REF, ROUND, SIN, SQRT, STDEV, STDEVPR, SUMIFEQ, SUMIFNE, SUMIFGE, SUMIFGT, SUMIFLE, SUMIFLT, SUMR, TAN, TICKms, TICKus, TOINT, TOREAL, TRUNC

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Data Types

The Do-more PLC supports the following seven primary data types:

- Bit (0 or 1)
- Unsigned Byte (0 to 255)
- Signed Byte (-128 to 127)
- Unsigned Word (0 to 65,535)
- Signed Word (-32,768 to 32,767)
- Signed DWord (-2,147,483,648 to 2,147,483,647)
- Real (-3.4028235E+038 to 3.4028235E+038)

Data Structures

The Do-more PLC supports data structures as additional data types. Structures use the familiar PC programming organization of "dot notation". All available elements of a structure are shown in this format. The following data structures are currently available:

- | | |
|-----------------------|---------------------------|
| • Timer Structure | • Stream Structure |
| • Counter Structure | • SIM_Process Structure |
| • String Structure | • Server Structure |
| • PID Structure | • Peerlink Structure |
| • Date/Time Structure | • I/O_Master Structure |
| • Task Structure | • Eth_IO_Master Structure |
| • Rampsoak Structure | • GS Drive Structure |
| • Program Structure | • Packet Structure |
| • DeviceRef Structure | |
| • Drum Structure | |

The data structure is a set of data. For instance, a Timer structure (Timer Struct) has the following set of data:

- Acc (Accumulated Time, Signed DWord)
- Done (Bit)
- Zero (Bit)
- Timing (Bit)
- Reset (Bit)

When you use a timer instruction (TMR), a Timer structure is assigned to the instruction. If you select 'T0', you can access the above data with dot notation. For instance, to access the accumulated time (Acc), enter 'T0.Acc'. To access the Done bit, enter 'T0.Done'.

Memory Addressing

With the Do-more PLC, each memory address type has its own specific data type. Here are some examples:

- V (Unsigned Word)
- N (Signed Word)
- D (Signed DWord)
- R (Real)

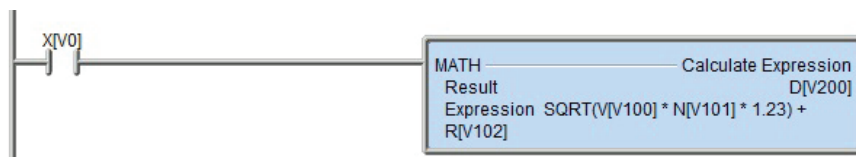
If you see address 'V123' in the ladder program, the memory address always stores an Unsigned Word value. With this memory addressing method, it becomes easier to read and write the ladder programs.

Although most of the memory addressing is decimal, the memory addresses DLX, DLY, DLC and DLV use octal. These four memory address types can be used to exchange data with DirectLOGIC PLCs, which use octal memory addressing.

Do-more T1H Series PLC Overview

Array Addressing

The Do-more PLC supports one-dimensional array addressing with all memory addresses. A V-memory address must be used as the index for an array. With the Do-more PLC, the following ladder program is valid.



Note: In this example, V0, V100, V101, V102 and V200 are indices.

Code-block, Program and Task

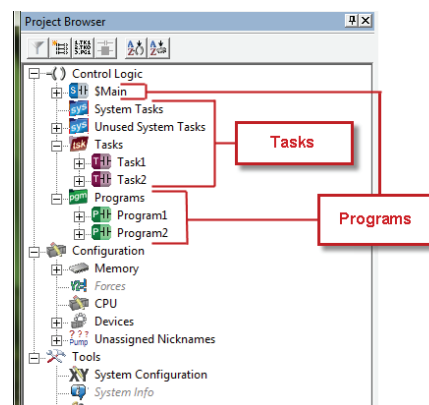
One Do-more project can consist of more than one ladder program. Each ladder program is called a 'Code-block'. The Do-more PLC supports two types of code-blocks, Program and Task:

Program

Programs are code-blocks that run based on an event using the RUN instruction. They can be self-terminating or never terminate. Stage programming is only supported inside Program code-blocks.

Task

Tasks are code-blocks that are enabled and disabled using the ENTASK instruction. The ENTASK instruction allows you to specify an interval to execute the task's logic with a millisecond resolution or to execute a single time on a leading edge input.



Stages

The Do-more PLC supports Stages. You can use Stages only in the Program code-blocks. (They are not available in the Task code-blocks.) The Do-more PLC supports the following instructions for Stage Programming¹:

- SG (Stage)
- JMP (Jump To Stage)²
- JMPL (Index Jump)
- SGSET (Enable Stage)
- SGRST (Disable Stage)
- SGRSTR (Disable Range of Stages)
- SGCONVRG (Converge Multiple Stages to SG)
- SGDIVRG (Jump to Multiple Stages)



¹ There is no ISG (Initial Stage) instruction for the Do-more PLC; the first stage in the Program code-block becomes the initial stage automatically.

² Many asynchronous instructions can directly initiate a Jump to Stage.

